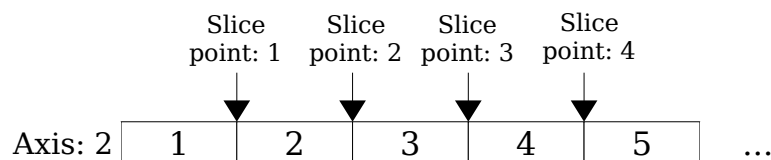


## Slice layer

The slice layer chops a blob along a particular axis. Consider a blob of dimension (700 3 20). To extract the  $n^{\text{th}}$  element of the 3<sup>rd</sup> axis, slice points at  $n-1$  and needed. This is illustrated below.



The boxes are the elements along the 3<sup>rd</sup> axis and are numbered starting from 1. To get the 3<sup>rd</sup> element for example, you need to slice at slice points 2 and 3. This will create 3 top blobs of dimensions (700 3 2), (700 3 1) and (700 3 17).

```
layer {
  name: "Slice"
  type: "Slice"
  slice_param {
    axis: 2
    slice_point: 2
    slice_point: 3
  }
  bottom: "bb_name"
  top: "top1"           # dimension (700 3 2)
  top: "top2"           # dimension (700 3 1)
  top: "top3"           # dimension (700 3 17)
}
```

## Norm layer

The norm layer normalises a blob by subtracting the mean and dividing by the standard deviation.

### Axis and split

A blob may contain multiple types of data stored along one or more axes which should not be grouped together. The axis and split parameters allow you to specify which axes are grouped together for normalising.

The axis parameter set at a value  $n$  means that Axis 1 to Axis  $(n-1)$  are normalised separately. The split parameter then specifies whether Axis  $n$  itself is normalised separately or together. Axes from  $(n+1)$  onwards, if they exist, will be normalised together.

For example consider a blob of dimension (700 3 10 20) with the structure

- Axis 0: timestep axis
- Axis 1: dengue, rainfall and temperature ("data type")
- Axis 2: country, enumerated with numbers
- Axis 3: window of previous 20 weeks' data

If you wanted to separately normalise each data type by country, you could do

```
axis: 2
split: true

or

axis: 3
split: false
```

If you wanted to normalise each data type globally, you could do

```
axis: 1
split: true

or

axis: 2
split: false
```

You can also select the axis starting from the last by using negative numbers. For example

```
axis: -2
```

refers to the second last axis of the blob, ie axis 2.

### Length

You may sometimes not want to use all timesteps when calculating the means and standard deviations for normalisation. For example, during the test phase, you want to use the mean and standard deviation only of the training set so that the normalisation operation during the train and test phases are the same.

The length parameter allows you to select the number of timesteps to include when calculating the means and standard deviations. If the training set takes up the first 700 timesteps, then specify

```
length: 700
```

The means and standard deviations of the first 700 timesteps are used to normalise all timesteps in the blob.

The length parameter can also be set at -1 to include all timesteps in the blob.